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Low-Voltage Fuses – Part 10: Class L Fuses

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UL Standard for Safety for Low-Voltage Fuses – Part 10: Class L Fuses, UL 248-10

Second Edition, Dated August 1, 2000

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New product submittals made prior to a specified future effective date will be judged under all of the requirements in this Standard including those requirements with a specified future effective date, unless the applicant specifically requests that the product be judged under the current requirements. However, if the applicant elects this option, it should be noted that compliance with all the requirements in this Standard will be required as a condition of continued Listing, Recognition, and Follow-Up Services after the effective date, and understanding of this should be signified in writing.

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Page	Date
1-14	August 1, 2000

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Standardization and
Certification of the Electrical
Sector**

NMX-J-009/248/10-2000-ANCE
First Edition



CSA International
CSA C22.2 No. 248.10-00
Second Edition



**Underwriters Laboratories
Inc.**
UL 248-10
Second Edition



LOW-VOLTAGE FUSES – PART 10: CLASS L FUSES

August 1, 2000

Commitment for Amendments

This Standard is issued jointly by the National Association of Standardization and Certification of the Electrical Sector (ANCE), CSA International, and Underwriters Laboratories Incorporated (UL). Amendments to this Standard will be made only after processing according to the Standards writing procedures by ANCE, CSA, and UL.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

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Preface

This is the common UL, CSA, and ANCE Standard for *Low-Voltage Fuses – Part 10: Class L Fuses*. This is the second edition of CSA C22.2 No. 248.10-00 (superseding the first edition, published in 1994), the second edition of UL 248-10, and the first edition of NMX-J-009/248/10-2000-ANCE.

This Standard was prepared by a Technical Harmonization Committee comprised of members from Underwriters Laboratories, CSA International, the National Association of Standardization and Certification of the Electrical Sector, the end product manufacturers, and material suppliers. The efforts and support of the members of the Technical Harmonization Committee are gratefully acknowledged.

This Standard was reviewed by the CSA Subcommittee of Fuses and approved by the Technical Committee on Industrial Products under the jurisdiction of the CSA Strategic Resource Group.

This Standard will be submitted to the American National Standards Institute (ANSI) for publication as an American National Standard.

Note: Although the intended primary application of this Standard is stated in its scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their purpose.

Level of Harmonization

This trinational standard is published as an Identical Standard. An identical standard is a standard that is the same in technical content except for conflicts in Codes and Governmental Regulations. Presentation is word for word except for editorial changes.

Interpretations

The interpretation by the SDO (Standards Development Organization) of an identical standard shall be based on the literal text to determine compliance with the standard in accordance with the procedural rules of the SDO. If more than one interpretation of the literal text has been identified, a revision shall be proposed as soon as possible to each of the SDOs to more accurately reflect the intent.

UL Effective Date

This edition of the standard is now in effect.

CSA Effective Date

The effective date for CSA will be announced through either a *CSA Informs* or *CSA Certification Notice*.

ANCE Effective Date

The effective date for ANCE will be announced through the *Diario Oficial de la Federation (Official Gazette)* and is indicated on the cover page.

Foreword (ANCE)

The Present Mexican Standard was developed by the Low Voltage Fuses Subcommittee from the Comité de Normalización de la Asociación Nacional de Normalización y Certificación del Sector Eléctrico, A.C., CONANCE, with the collaboration of the fuse manufacturers and users.

ANCE is a National Organization for Standardization (ONN) registered by the DGN (Dirección General de Normas) in the electrical sector and household appliances which develops Mexican Standards (NMX) and collaborates in the development of the Mexican Official Standards (NOM), voluntary and mandatory standards, respectively.

The conformity assessment in accordance with ANCE Mexican Standards is responsibility of ANCE Certification Products Division.

The ANCE Certification Products Division is accredited by the EMA (Entidad Mexicana de Acreditación) in order to certificate a variety of products. The certification is carry out following the corresponding procedures established and developed by the Technical Committee of Certification in connection with the test reports performed in test labs accredited by the EMA.

The conformity assessment activities developed by ANCE cover quality systems, test lab and verification products.

Foreword (CSA)

The Canadian Standards Association, which operates under the name CSA International (CSA), provides certification services for manufacturers who, under license from CSA, wish to use the appropriate registered CSA Marks on certain products of their manufacture to indicate conformity with CSA Standards.

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In performing its functions in accordance with its objectives, CSA does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of the Association represent its professional judgement given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed.

Products in substantial accord with this Standard but which exhibit a minor difference or a new feature may be deemed to meet the Standard providing the feature or difference is found acceptable utilizing appropriate CSA Certification and Testing Division Operating Procedures. Products which comply with this Standard shall not be certified if they are found to have additional features which are inconsistent with the intent of this Standard. Products shall not be certifiable if they are discovered to contravene applicable laws or regulations.

Testing techniques, test procedures and instrumentation frequently must be prescribed by the CSA Certification and Testing Division in addition to the technical requirements contained in Standards of CSA. In addition to markings specified in the Standard, the CSA Certification and Testing Division may require special cautions, markings and instructions that are not specified by the Standard.

Some tests required by CSA Standards may be inherently hazardous. The Association neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the manufacturer or the Association, and whether or not any equipment, facility or personnel for or in connection with the test is furnished by the manufacturer or the Association.

Manufacturers should note that, in the event of the failure of the CSA Certification and Testing Division to resolve an issue arising from the interpretation of requirements, there is an appeal procedure: the complainant should submit the matter, in writing, to the Secretary of the Canadian Standards Association.

If this Standard is to be used in obtaining CSA Certification please remember, when making application for certification, to request all current Amendments, Bulletins, Notices and Technical Information Letters that may be applicable and for which there may be a nominal charge. For such information or for further information concerning CSA Certification please address your inquiry to Applications and Customer Service, CSA International, 178 Rexdale Boulevard, Toronto, Ontario M9W 1R3.

No Text on This Page

Foreword (UL)

A. This Standard contains basic requirements for products covered by Underwriters Laboratories Inc. (UL) under its Follow-Up Service for this category within the limitations given below and in the Scope section of this Standard. These requirements are based upon sound engineering principles, research, records of tests and field experience, and an appreciation of the problems of manufacture, installation, and use derived from consultation with and information obtained from manufacturers, users, inspection authorities, and others having specialized experience. They are subject to revision as further experience and investigation may show is necessary or desirable.

B. The observance of the requirements of this Standard by a manufacturer is one of the conditions of the continued coverage of the manufacturer's product.

C. A product which complies with the text of this Standard will not necessarily be judged to comply with the Standard if, when examined and tested, it is found to have other features which impair the level of safety contemplated by these requirements.

D. A product employing materials or having forms of construction which conflict with specific requirements of the Standard cannot be judged to comply with the Standard. A product employing materials or having forms of construction not addressed by this Standard may be examined and tested according to the intent of the requirements and, if found to meet the intent of this Standard, may be judged to comply with the Standard.

E. UL, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of UL represent its professional judgment given with due consideration to the necessary limitations of practical operation and state of the art at the time the Standard is processed. UL shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. UL shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

F. Many tests required by the Standards of UL are inherently hazardous and adequate safeguards for personnel and property shall be employed in conducting such tests.

Low-Voltage Fuses – Part 10: Class L Fuses

1 General

NOTE –

This Part is intended to be read together with the Standard for Low-Voltage Fuses – Part 1: General Requirements, hereafter referred to as Part 1. The numbering of the clauses in this Part corresponds to like numbered Clauses in Part 1. The requirements of Part 1 apply unless modified by this Part. For Clauses not shown below, refer to the Standard for Low-Voltage Fuses – Part 1: General Requirements, NMX-J-009/248/10-2000-ANCE ♦ CSA C22.2 No. 248.1 ♦ UL 248-1.

1.1 Scope

This Part applies to Class L fuses rated 601 – 6000 A and 600 V ac. DC ratings are optional.

4 Classification

Class L fuses are non-renewable, current-limiting bolt-in type with an interrupting rating of 200,000 A. Class L fuses are divided into nine body sizes with the maximum current rating I_n for each size specified in this part. Time-delay ratings are optional.

5 Characteristics

5.2 Voltage rating

For AC, the rating shall be 600 V ac.

The DC voltage rating may be different from the AC rating.

5.3 Current rating

Refer to Figure A for range of current ratings in each body size.

5.5 Interrupting rating

For AC – 200,000 A

For DC, the preferred ratings are 20,000, 50,000, 100,000, 150,000, or 200,000 A.

5.6 Peak let-through current and clearing I^2t characteristics

Maximum values of peak let-through current and clearing I^2t are given in Table A.

Table A – Maximum peak let-through current and clearing I^2t for 600 volt Class L fuses

Current rating I_n , A	Between threshold and 50 kA		At 100 kA		At 200 kA	
	Peak let-through current, A	I^2t , ampere-squared seconds	Peak let-through current, A	I^2t , ampere-squared seconds	Peak let-through current, A	I^2t , ampere-squared seconds
601 – 800	80,000	10,000,000	80,000	10,000,000	80,000	10,000,000
801 – 1200	80,000	12,000,000	80,000	12,000,000	120,000	15,000,000
1201 – 1600	100,000	22,000,000	100,000	22,000,000	150,000	30,000,000
1601 – 2000	110,000	35,000,000	120,000	35,000,000	165,000	40,000,000
2001 – 2500	–	–	165,000	75,000,000	180,000	75,000,000
2501 – 3000	–	–	175,000	100,000,000	200,000	100,000,000
3001 – 4000	–	–	220,000	150,000,000	250,000	150,000,000
4001 – 5000	–	–	–	350,000,000	300,000	350,000,000
5001 – 6000	–	–	–	350,000,000	350,000	500,000,000

6 Marking

6.1 Class L fuses may be marked "Time Delay."

7 Construction

7.1 Dimensions

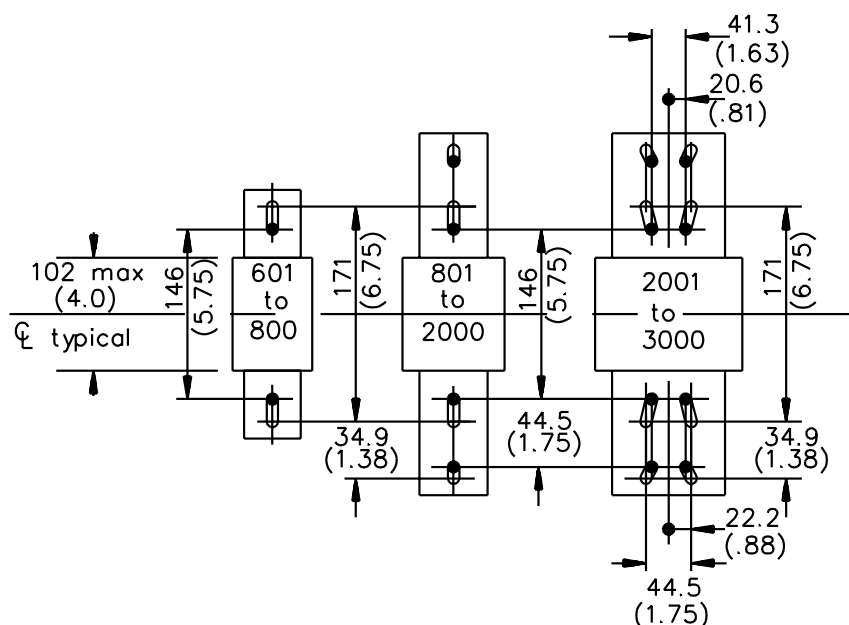
Fuse dimensions are shown in Figures A and B.

7.2 Current-carrying parts

7.2.1 The terminals of Class L fuses shall be electroplated with nickel, silver, tin, or treated by other means to provide equivalent protection.

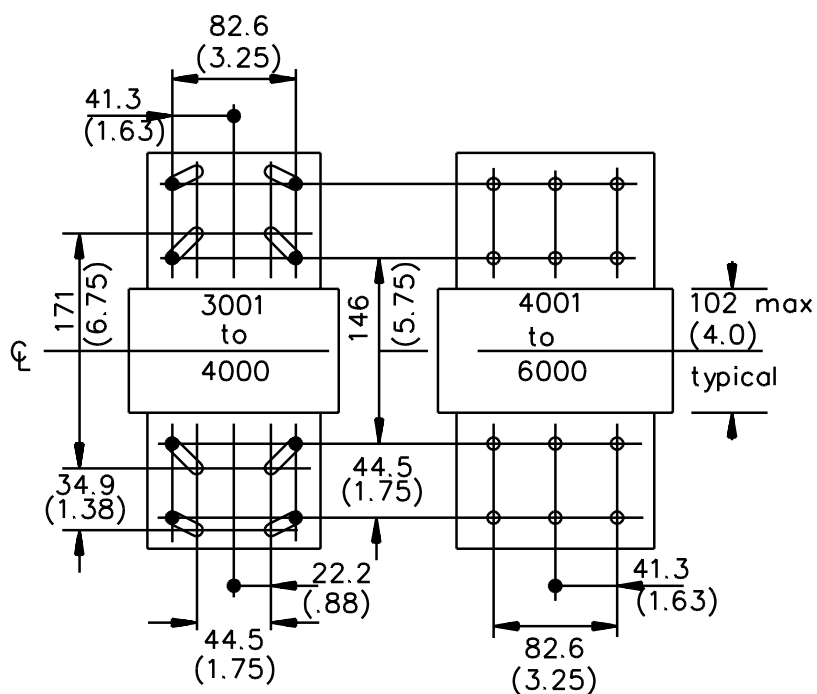
Figure A – Dimensions of Class L fuses in mm (in)

THE MINIMUM DISTANCE
FROM MIDPOINT OF FUSE
TUBE TO THE NEAREST LIVE
PART IS 12.7 mm (.5 IN)



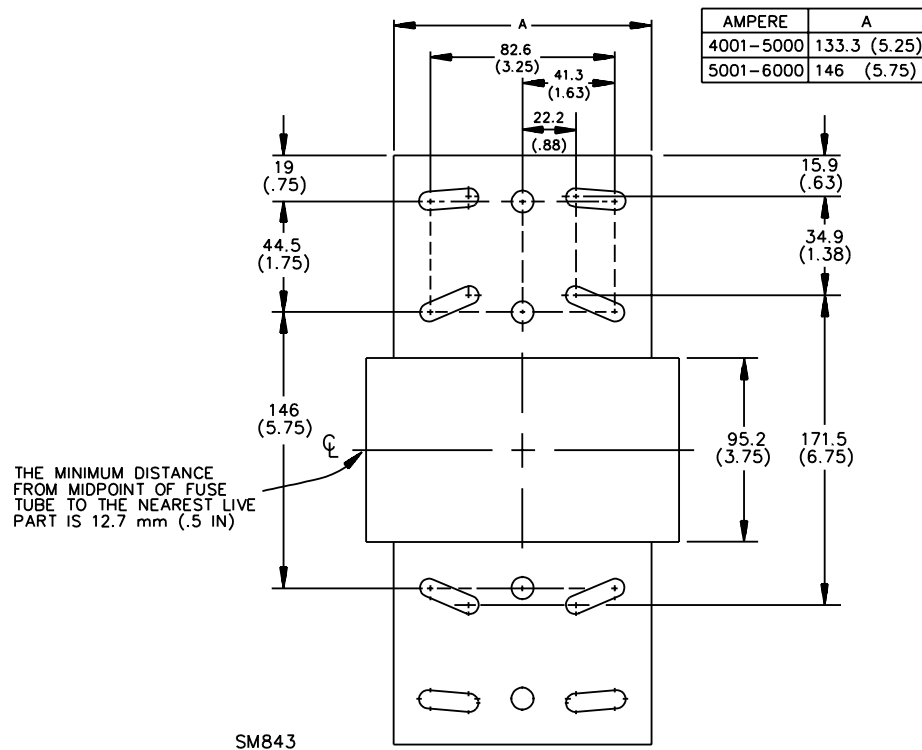
SM652A

THE MINIMUM DISTANCE
FROM MIDPOINT OF FUSE
TUBE TO THE NEAREST LIVE
PART IS 12.7 mm (.5 IN)



SM652B

Figure B – Alternative dimensions 4001 to 6000 A in mm (in)



Current Rating I_n , A	Overall Length ± 2.4 (± 0.09)	Dimensions ^a		
		Body	Terminal	
		Diameter (Maximum)	Width ± 1.6 (± 0.06)	Thickness ± 0.8 (± 0.03)
601 – 800	219 (8.63)	64.3 (2.53)	50.8 (2.00)	9.53 (0.38)
801 – 1200	273 (10.75)	70.6 (2.78)	50.8 (2.00)	9.53 (0.38)
1201 – 1600	273 (10.75)	77.0 (3.03)	60.3 (2.38)	11.1 (0.44)
1601 – 2000	273 (10.75)	89.7 (3.53)	69.9 (2.75)	12.7 (0.50)
2001 – 2500	273 (10.75)	128 (5.03)	88.9 (3.50)	19.1 (0.75)
2501 – 3000	273 (10.75)	128 (5.03)	102 (4.00)	19.1 (0.75)
3001 – 4000	273 (10.75)	147 (5.79)	121 (4.75)	19.1 (0.75)
4001 – 5000	273 (10.75)	182 (7.17)	133 (5.25)	25.4 (1.00)
5001 – 6000	273 (10.75)	182 (7.17)	146 (5.75)	25.4 (1.00)

^a Hole diameters and slot widths are 15.9 ± 0.8 mm (0.63 ± 0.03 in). All other tolerances ± 0.4 mm (± 0.02 in). Shaded holes indicate drilling required for fuse mounting.

8 Tests

8.2 Verification of temperature rise and current-carrying capacity

1.1 I_n – Temperature rise and current-carrying capacity (I_{nf})

8.2.4 Acceptability of test results

The maximum temperature rise above the calibration temperature rise of the test equipment shall not exceed 65°C.

8.3 Verification of overload operation

Part 1, Table 4

Test 2 – 1.5 I_n

8.3.3.2 Time delay test

There is no specified test for time delay.

8.4 Verification of operation at rated voltage

For AC – Part 1, Table 5

Test 1 – 200 kA

Test 2 – Maximum energy

Test 3 – Threshold ratio; the maximum threshold ratio shall be:

- a) 30 for 601 – 1200 A;
- b) 35 for 1201 – 2000 A;
- c) 40 for 2001 – 4000 A; and
- d) Ratio not applicable above 4000 A.

Test 4a – 100 kA

Test 4b – 50 kA

Peak let-through current and clearing I^2t recorded during test 1, 4a, and 4b.

For DC (optional) – Part 1, Table 6

Test 1 – Interrupting rating

Test 5b – 3.0. I_n ,

or

Test 5c – $2.0 I_n$ or any current in the range of $2.0 I_n - 3.0 I_n$ at rated DC voltage.

8.5 Verification of peak let-through current and clearing I^2t characteristics

8.5.3 Acceptability of test results

In addition to the requirements in Part 1: Peak let-through current and clearing I^2t values recorded shall not exceed the limits specified in Table A.